

University of Texas Rio Grande Valley

**ScholarWorks @ UTRGV**

---

Information Systems Faculty Publications and  
Presentations

Robert C. Vackar College of Business &  
Entrepreneurship

---

2021

## Is First Impression Relevant in Online Health Support Communities? Preliminary Investigation of the Effects of Social Presence

Joseph A. Manga

Emmanuel Wusuhon Yanibo Ayaburi

*The University of Texas Rio Grande Valley*, [emmanuel.ayaburi@utrgv.edu](mailto:emmanuel.ayaburi@utrgv.edu)

Francis Andoh-Baidoo

*The University of Texas Rio Grande Valley*

Follow this and additional works at: [https://scholarworks.utrgv.edu/is\\_fac](https://scholarworks.utrgv.edu/is_fac)



Part of the [Business Commons](#), and the [Medicine and Health Sciences Commons](#)

---

### Recommended Citation

Manga, J., Ayaburi, E., & Andoh-Baidoo, F. (2021). Is First Impression Relevant in Online Health Support Communities? Preliminary Investigation of the Effects of Social Presence. Proceedings of the 54th Hawaii International Conference on System Sciences, 3625. <https://doi.org/10.24251/HICSS.2021.440>

This Conference Proceeding is brought to you for free and open access by the Robert C. Vackar College of Business & Entrepreneurship at ScholarWorks @ UTRGV. It has been accepted for inclusion in Information Systems Faculty Publications and Presentations by an authorized administrator of ScholarWorks @ UTRGV. For more information, please contact [justin.white@utrgv.edu](mailto:justin.white@utrgv.edu), [william.flores01@utrgv.edu](mailto:william.flores01@utrgv.edu).

## Is First Impression Relevant in Online Health Support Communities? Preliminary Investigation of the Effects of Social Presence

Joseph A. Manga  
University of Texas RGV  
[joseph.manga01@utrgv.edu](mailto:joseph.manga01@utrgv.edu)

Emmanuel W. Ayaburi  
University of Texas RGV  
[emmanuel.ayaburi@utrgv.edu](mailto:emmanuel.ayaburi@utrgv.edu)

Francis Kofi Andoh-Baidoo  
University of Texas RGV  
[francis.andohbaidoo@utrgv.edu](mailto:francis.andohbaidoo@utrgv.edu)

### Abstract

*Patients' initial impression can influence the kind of reactions they receive and their subsequent participation. Prior studies use inference models to examine participation as a continuum phenomenon. In the online health supporting communities (OHSCs), distinguishing giving participation from receiving participation provide interesting insights at the granular level. Using social presence theory, this study identifies and uses social presence cues in the initial post of 168 patients to predict patients' giving and receiving participation in a prominent OHSC. Findings reveal that the social presence cues affected the two participation dimensions differently. Specifically, while intimacy is the most important predictor of giving participation, nonverbal communication is the most important predictor for receiving participation. The study offers important contributions to research and practice.*

### 1. Introduction

First impressions in both offline and online settings are enduring. Reactions to first impressions can define the level of participation in online platforms. For instance, a patient in an online health support community (OHSC), who does not clearly articulate the urgency of their situation may elicit slow responses from other patients on the platform. Consequently, the support given to participants in OHSCs depends on the level of understanding of the content of patients' initial posts (see [51] [53] [57] [43]). The level of participation in online communities is an indication of peer support [6]. Participation is mostly lumped as an aggregate of an individual's overall activity. However, users' assessment of an initial message can affect content generation (giving) and content consumption (receiving) differently by participation due to their impression or appreciation of the message ([44] [56]). For example, a message that does not forcefully request for in-depth feedback may only elicit votes, thumbs up or down from the audience on the platform.

Prior studies in OHSCs have used different theoretical lenses to understand patients' participation with little focus on the effect of initial postings on

giving or receiving participation. For instance, prior research used social capital theory or social identity theory to suggest the formation of bonds and relationships development in OHSCs participation [22] [42]. Since OHSCs are ad hoc and fluid in nature, users may be turned away from developing long-term relationships if the initial experience of support is not desirable. About 98% of users who join online forums do not participate in the discussions or post their opinions [46] [35]; and about 34% join more than one online community [77] [69]. This kind of multihoming behavior may reduce the efficacy of a community. It is therefore relevant that community managers stimulate dynamic participation among the users on the platform by understanding the primary drivers of first impressions.

The goal of this study is to investigate how online participation is influenced by first impressions created by users in OHSCs from a social presence theory (SPT) perspective. Social presence involves mental and emotional activities such as social orientation, identifying motivations, groupthink, and what inspires the feeling of collaboration, even in online settings [50]. These key features of an individual's social presence can be inferred from the patients' initial postings. This study examines patients' participation through content generation (giving) and via content consumption (receiving) [9] [7] and seeks to specifically answer the following research question:

*How do the dimensions of social presence in patients' initial postings interact to influence an individual's giving or receiving participation behavior in an online health support community?*

Previous research has shown that social presence influences user collaborative behaviors in the workplace [60]. In situations where users' initial participation can determine their feelings about social presence, SPT will be useful in explaining how such initial feelings determine subsequent user participation. Studies have shown that different communication techniques (verbal, nonverbal, written, listening, and visual) have different effects on voluntary participatory behavior [66][28]. Community

members communicate better when there is high social presence [44] [49] [55] [71] [76].

## 2. Background Review

### 2.1. Participation in online communities

In the healthcare context, many patients visit OHSCs and about one in four patients find others who share similar health conditions [23]. Participation in OHSCs have attracted attention from researchers who have used different theories to explain this phenomenon. For example, research has suggested that leadership characteristics (task-based behaviors and technical communications) are effective influencers of knowledge collaboration in online health support communities [15] [22]. Furthermore, social capital theory has been used to study participation in online communities to enhance bond and relationships formation [22]. From the social identity theory perspective, prior literature suggests that in the context of online community, social identity has a significant effect on participation [42]. Additionally, word-of-mouth and stickiness promote participation in online community platforms [25]. Information systems success model posits that information and system qualities are important drivers of IS success. Flow theory suggests that users who are in flow totally participate in platform activities by spending more time without noticing [25] [13]. Moreover, extant research has used motivational theory and social presence theory to study participation in online communities. Users participate in online communities to seek information, entertain themselves, and socially interact with others [16] [45].

This study focuses on the stage between a user joining the platform and the stage the user starts to build relationships. However, because OHSCs are ad hoc, participants need to be welcomed before participation. The degree to which the participant will be welcome to the platform depends on how they present themselves. Therefore, patients need to craft their first postings to create an impression that will result in users showing enthusiastic levels of participation. Hence, the current study focuses on this important aspect of patients' participation in OHSCs.

### 3. Theory and hypotheses – social presence

Social presence is the ability to use communication media to transmit social cues when interacting on a social media platform [74] [55]. Social presence is also defined as the feeling of community a learner experiences in an online environment [63]. In group settings, social presence is considered as the awareness of others in an interaction, combined with an appreciation of the interpersonal aspects of that interaction [55] [50]. Social presence explains how

people initially form relationships [73]. Social presence is key in several contexts such as, electronic learning (e-learning) context where a learner's ability to portray themselves as real members of a community in social and emotional ways promotes active learning [32]. Tu [62] argued that within distance learning, social presence rests upon three dimensions: social context, online communication, and interactivity. Images and writings heighten the level of social presence in a computer mediated environment [26] [9]. For example, images and writings on Facebook have a higher sense of social presence than blogs whose contents are mainly writings [34] [9]. Studies have shown that online worlds have high degrees of social presence due to the textual, verbal, and nonverbal communication cues they provide [60] [24]. Stronger social presence drives online content generation due to motivation to read others' responses and reply to messages [52]. Consequently, as postulated by prior research, higher degrees of social presence lead to higher participation of individuals in the discussion and communication on the platform [9]. Social presence theory is primarily composed of intimacy, immediacy, efficiency, and nonverbal communication [55]. Social presence increases the feelings of closeness in relationships, urgency in response, and reliability in passing across a message [24] [9].

Prior research postulate that the mere presence of individuals in a community can reinforce their contributions or participation (e.g., [12] [38]). Individuals tend to participate more in the community when they have positive perceptions of others' presence [36]. Since social presence reflects the degree of salience of the other person in a community, it follows that social presence will affect the degree of interaction taking place, and hence, is required to enhance online community participation [37]. This participation could be in the form of giving or receiving support [44] [56]. Applying SPT to a first post, literature suggests there is a connection between how users present themselves and behave as a results of signals in social presence cues [14] [59] [63] [79]. Figure 1 is our research model.

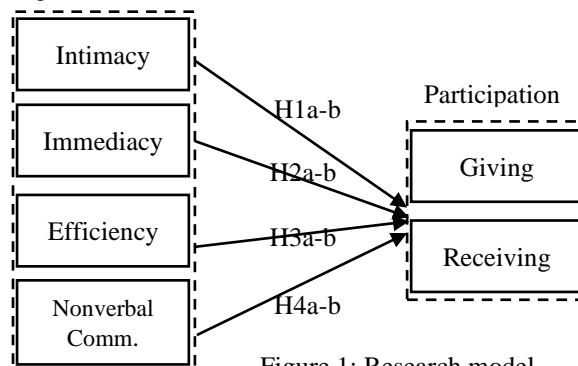


Figure 1: Research model

### 3.1. Effect of social intimacy on participation

Intimacy is defined as the feeling of closeness and belonging that two people may feel with each other [78]. Intimacy in interaction is influenced by several factors, such as physical distance, eye contact, smiling, body language, and potential conversation topics [2]. Individuals' perceptions of intimacy are usually created at the instance of first interaction. Individuals create intimacy by interpreting nonverbal cues, whether it is in person or online [11]. Intimacy in the initial stages is established through emotional discourse or through the use of emotional vocabulary [4]. In the initial phase of communication, the use of emotional vocabulary, however, does not allow for a lengthy process or for the creation of a lasting relationship, but rather to facilitate the staging of one's story [4]. Individuals who visit health forums aim to form small but homogeneous support communities, which foster intimacy in their interactions [19]. The motivation for an individual to share information will help others on the platform to easily provide adequate support to them [27]. Thus, higher levels of intimacy connect patients together through posting and replying to each other's messages. Hence, stronger bonds of closeness increase the level of participation in an online health support community.

H1a: *Intimacy in patients' initial communication is associated with giving participation.*

H1b: *Intimacy in patients' initial communication is associated with receiving participation.*

### 3.2. Effect of social immediacy on participation

Immediacy is defined as giving urgency or importance to an exchange [17] [10]. When communicating with others, urgency indications give a sense of value and importance to the relationship [17]. Immediacy in this study refers to the degree to which individuals on an online health support community give urgency and place importance to the messages that are shared. Community users signal immediacy through their sense of urgency, excitement, and instant involvement in the discussions, and timely response to posts. These qualities are evidences of higher commitment in the online discussion forums. Studies have revealed that community commitment impacts replying and posting (participation) behaviors in online discussion communities [6]. Hence, high sense of immediacy will result in increase in participation by others in reading and responding in a more urgent manner.

H2a: *Immediacy in patients' initial communication is associated with giving participation.*

H2b: *Immediacy in patients' initial communication is associated with receiving participation.*

### 3.3. Effect of social efficiency on participation

Efficiency refers to the degree to which users in an OHSC judge the reliability of communicating their messages across to the target [55] [41]. Individuals use the online communities as the communication media through which they interact with their peers. A patient judges a medium to be efficient when it performs well consistently, protects patients' privacy concerns, and secures their information. A higher sense of media efficiency will increase participation in the discussions (see [19]). Thus, social media efficiency will increase giving and receiving participation.

H3a: *Efficiency in patients' initial communication is associated with giving participation.*

H3b: *Efficiency in patients' initial communication is associated with receiving participation.*

### 3.4. Effect of social nonverbal communication on participation

Nonverbal communication in this study refers to the extent to which individuals participating in an online forum use cues in their writings to express their feelings and emotions. Nonverbal cues such as body language, voice intonation, and conveyance of language are absent in the online context and therefore, social presence is relatively low (e.g., [9]). The limitation of nonverbal cues may decrease understandability of the interactions; hence, participation could be slowed. Literature has shown that consumers' affective response to a product is influenced by sensory cues [11]. Also, a recent study suggests that nonverbal cues are linked to messages of intimacy and arousal [2] [17] [29]. However, since users who visit the platform come for support rather than relationship, it is less likely that they will share posts with the aim to arouse feelings of closeness. Hence, messages involving more nonverbal cues will decrease interest and participation on these platforms.

H4a: *Nonverbal communication cues in patients' initial communication is associated giving participation.*

H4b: *Nonverbal communication cues in patients' initial communication is associated with receiving participation.*

## 4. Proposed Methodology

### 4.1. Research design and data collection

To investigate the research objective, data was sourced from a popular online health community, *inspire.com* between March and April 2020. Inspire.com has been used in some prior studies (e.g., [67] [27] [30] [39]) because it has a growing number of users, which offers patients the opportunities to interact through giving, receiving supports, and includes networking features and a real-time research platform [58]. For example, a support group

“spontaneous coronary artery disease (SCAD)” on inspire.com convinced some researchers to initiate the creation of a registry that studies rare diseases such as SCAD [65]. Data from inspire.com platform has been used in prior research [68]. The platform has over 50 communities for various disease types [31]. For this study, data was obtained on patient participation from three communities - depression, HIV/AIDS, and drug abuse. Since patients come on these platforms for support, the communities are noted for the high degrees of user responsiveness and interactivity [67] on the different support groups/communities that are on the platform. Users demonstrate responsiveness in showing supportive behaviors by reacting to or reading other’s posts. Therefore, participation is key to the survival of online health support communities [58]. Initially, about 200 observations were collected. After cleaning, transforming, and removing outliers and missing data, the final usable sample size for the analysis was 168 user level observations, which included user initial postings, replies, and supportive behaviors as well as data about the different communities that users belong to, their ages, gender, and the length of time they have been on the platform.

#### 4.2. Variables and measures

Table 1 presents the operational definition and measurement of the key variables of the study. The predictor variables obtained are from patients first/initial postings. The outcome variables are obtained from the platform audience response. *Immediacy* represents a sense of enthusiasm expressed in the messages by a user and it is operationalized as the emotional tone in user posts [18]. *Intimacy* is the user’s sense of belongingness to the community. Following the personal assessment of intimacy in relationships [54], it is operationalized as the aggregate of the number of friends who always provide responses to a user’s post. *Efficiency* is the user’s judgement about the reliability of information on the platform and is operationalized as the authentic [69] scores from sentiment analysis of user initial postings. *Nonverbal communication* is the degree to which users rely on cues on the platform and it is operationalized as the affect scores [72] from sentiment analysis of user initial postings. Scores for the measures were extracted from the sentiment analysis method using the linguistic inquiry and word count (LIWC) program [40] [1]. Thus, we use LIWC tool to measure the emotional tone that is, strength of the emotions in the posts, calculated/scored on a 100-point scale ranging from 0 to 100; affect -- extent to which a person is in an enthusiastic or in an aversive mood state [72], scored on a 100-point scale ranging from 0 to 100; and authentic that is, extent to which a post is personal and self-disclosing, scored on a 100-

point scale ranging from 0 to 100 [75]. Opinion mining is a discipline that uses computer techniques to extract, classify, understand, and assess individuals’ opinions expressed in text messages [41] [8].

The dependent variable of the study is *Participation*, which is considered as two dimensions-giving and receiving participation normalized by the user length of stay on the platform. *Giving* is the ration of total number of posting and responding activities that a user provides to others/groups (posts and replies a user provides) to user tenure on the platform. *Receiving* is the ration of total number of supports a user gets from others (as support votes, thanks votes, useful votes) to user tenure on the platform. The study controls for user’s age and gender.

Table 1: Operational constructs and measurements

Variable	Definition	Operationalization
Intimacy (INT)	Degree to which users in an OHSC feel a sense of closeness and belonging.	The number of friends a user has on the platform [54].
Immediacy (IMM)	Degree to which users in an OHSC portray a sense of positive attitude and enthusiasm to the messages shared.	Measured by obtaining the <i>emotional tone</i> scores in the <i>patient’s initial post</i> from the sentiment analysis [18].
Efficiency (EFF)	Degree to which users in an OHSC judge the reliability of passing the message across to the target.	Measured by obtaining the <i>authentic</i> scores from sentiment analysis of <i>patient’s initial post</i> [75].
Nonverbal Communication (NVC)	Degree to which users in an OHSC use cues in their writings to express their feelings and sentiments.	Measured by obtaining the <i>affect</i> scores from the sentiment analysis of <i>patient’s initial post</i> [72].
Giving Participation	Degree to which users participate in OHSC discussions by contributing to generate contents.	The total number of posts a user provides less their initial post to group discussions and replies to others’ posts normalized by

		user length of stay on the platform [44] [56].
Receiving Participati on	Degree to which users participate in OHSC discussions by amount of feedback a user's post gets from other users.	Aggregate of the number of votes (support, thanks, and useful) a user's post receives from others normalized by user length of stay on the platform [44] [56].

Table 2 presents the descriptives of the demographics and the main variables. Age was categorized into six groups with value from 0 indicating ages less than 20, to value 5 indicating ages greater than 60, and value 6 for undisclosed ages.

Table 2: Descriptive statistics

	Mean	S.D.	Min	Max
Gender	0.86	0.80	0.00	2.00
Tenure	1908.5	1572.0	29.0	5150
Age Grp	3.80	1.78	0.00	6.00
M_Status	3.39	2.02	0.00	5.00
Giving	0.07	0.24	0.00	2.06
Receiving	0.09	0.29	0.00	2.57
IMM	45.17	39.81	0.00	99.00
INT	4.95	5.81	1.00	20.00
EFF	32.93	32.76	0.00	99.00
NVC	4.86	4.01	0.00	16.67

### 4.3. Analytic technique

The goal of this study was to distinguish which social presence indicators contribute to user giving and receiving participation decision. So, decision tree analytics approach is selected to investigate the research problem because it provides direct insight into which rules and criteria lead to a decision [51] and the use of DT induction can provide additional insights on the conditional relationships between independent and dependent variables that may not have been established using regression [47]. The results of the decision tree will provide OHSC operators with information relevant for influencing patients' participation in OHSCs. Specifically, the results of the study will identify the relative effects of social presence features on giving and receiving participation. The decision rules from the tree are the paths from the root node to the leaf node [48]. Decision trees are based on machine learning algorithms and methods, which enable predictive models to achieve high accuracy and precision [48]. The decision tree algorithms can solve classification

and regression problems. The classification and regression trees (CART) algorithm was used. Decision tree in this study was performed using rpart and rpart.plot packages in the R software with anova methodology. The anova methodology was selected because it is suitable for outcome variables with continuous data. To remove repetition of variables as the tree grows, the decision tree was trimmed to show max depth of three layers.

### 5. Preliminary Results

The decision tree on user participation is transformed to rules. The rules of the decision tree model for online health community users' giving and receiving are illustrated in Tables 3 and 4. See appendix for ANOVA Decision Tree for a) Giving versus b) Receiving participation in OHSCs.

Table 3: Main rules for the decision tree model of Giving Participation

- 1) root 168 329773.100 70.92857
- 2) Intimacy< 3.5 106 206430.900 57.97170
- 4) Efficiency< 45.405 65 101899.8 48.13846
- 8) NVComm< 7.4 48 71299.250 42.62500\*
- 9) NVComm>=7.4 17 25021.530 63.70588\*
- 5) Efficiency>=45.405 41 88282.1 73.56098
- 10) NVComm< 6.665 21 50280.29 61.2857\*
- 11) NVComm>=6.665 20 31514.950 86.450\*
- 3) Intimacy>=3.5 62 75122.600 93.08065
- 6) NVComm< 6.75 43 50944.510 83.81395
- 12) Efficiency< 31.99 24 27129.330 73.833\*
- 13) Efficiency>=31.99 19 18404.63 96.4210\*
- 7) NVComm>=6.75 19 12128.950 114.05260\*

Table 4: Main rules for the decision tree model of Receiving Participation

- 1) root 168 330661.900 65.97619
- 2) NVComm< 3.155 58 84668.500 43.50000
- 4) Intimacy< 1.5 17 25075.880 30.64706 \*
- 5) Intimacy>=1.5 41 55619.800 48.82927 \*
- 3) NVComm>=3.155 110 201243.700 77.82727
- 6) Intimacy< 13.5 90 164689.400 71.61111
- 12) NVComm< 6.675 41 78278.000 59.000\*
- 13) NVComm>=6.675 49 74434.69 82.1632\*
- 7) Intimacy>=13.5 20 17427.200 105.80000\*

The results of the decision tree show that intimacy feature on the platform is the most important predictor of user giving participation. In the case when the intimacy is low, user giving participation will be influenced by efficiency of information provided on the platform (see rule 2 in Table 3). On the other hand, when users have high view of intimacy, their giving participation will be driven by use of nonverbal communication cues on the online health support platform (see rule 3 in Table 3). Nonverbal communication is the most important predictor of user's receiving participation. When the use of

nonverbal communication is low, user receiving decision is driven by the degree of intimacy on the platform (see rule 2 in Table 4). However, when nonverbal communication is high and intimacy is high, user participation decision is driven by efficiency of information shared on the platform (see rule 3 in Table 4).

The anova results shown in Table 5 reveal that intimacy and nonverbal communication were significant in predicting giving participation at  $p < 0.01$  and  $p < 0.05$  respectively while intimacy and efficiency significantly predicted receiving participation at  $p < 0.001$  and  $p < 0.1$  respectively.

	DF	Sum sq	Mean sq	F-value	Pr (>F)
INT	1	0.612	0.612	11.181	0.0011**
IMM	1	0.025	0.0253	0.462	0.4975
EFF	1	0.140	0.139	2.550	0.1123
NVC	1	0.215	0.215	3.921	0.0491*
Res.	163	8.927	0.0548		

	DF	Sum sq	Mean sq	F-value	Pr (>F)
INT	1	0.935	0.935	11.722	0.0008***
IMM	1	0.035	0.035	0.440	0.5081
EFF	1	0.272	0.271	3.405	0.0668
NVC	1	0.184	0.184	2.308	0.1307
Res.	163	13.002	0.079		

Signif: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

The relative importance of the social presence factors that explain giving and receiving participation are shown in Table 6. The factors are scaled to sum up to 100 with higher values indicating more relative importance in predicting participation in OHSCs. The value of the variable importance is calculated as the sum of the goodness of each primary variable split and the goodness of all the surrogate splits [3]. For participation in giving, the order of importance is intimacy (40%), nonverbal communication (24%), efficiency (20%), and immediacy (15%). Receiving participation in descending order of importance is nonverbal communication (35%), immediacy (25%), efficiency (25%), and intimacy (15%). The table below shows the relative importance of the predictors of both giving and receiving participations respectively in descending orders.

Table 6: Variable importance

Giving				
Variable	INT	NVC	EFF	IMM
Importance	40	24	20	15
Receiving				

Variable	NVC	IMM	EFF	INT
Importance	35	25	25	15

The charts in Figure 3 and Figure 4 show the relative importance of social presence dimensions for giving and receiving participation, respectively. The results for giving participation suggest that users will consider intimacy to be the most important aspect of social presence while nonverbal communication is seen as the most effective factor when participating in online health support communities through receiving.

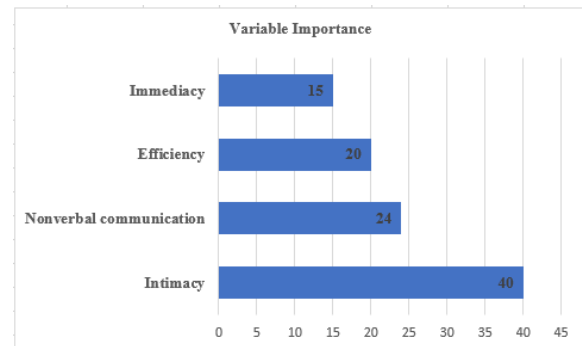


Figure 3: Variable importance for Giving

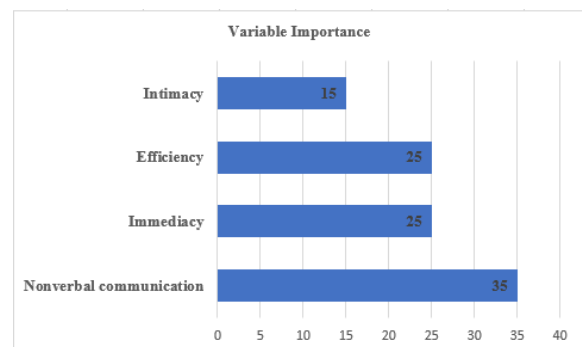


Figure 4: Variable importance for Receiving

## 6. Discussion and Implications

The study aimed to identify key features of patients' initial postings that influence participation in OHSCs. Using decision trees helped to provide information for deciding on the factors that influence patients' participation in OHSCs. The results of the analysis provide initial evidence that patients' giving participation is influenced by intimacy, followed by nonverbal communication, then efficiency, and finally immediacy. On the other hand, patients' receiving participation is affected by nonverbal communication, followed by immediacy, then efficiency, and finally intimacy. Surprisingly, immediacy was not found to influence either patients' giving or receiving participation in OHSCs.

Prior studies on the factors that promote participation in OHSCs generally suggest, among

other factors, health information seeking, communication, and health information efficacy [5]. We bring that important aspect of technology use decision-making into focus. The identified factors in this study inform the literature on individuals' judgmental processes in responding to protective technologies offered as part of crisis management. The SPT factors in an individual's initial message are salient in shaping users' online participation through the commitment of some in providing support and through the benefits others reap from the content that is being generated. For instance, intimacy impressions created in the initial stages sustain user commitment to group discussions. The results are consistent with prior studies that have provided evidence that users of online health services will increase their participation and length of stay on the platform when they feel a sense of connectedness when they join through giving and receiving of emotional and information supports [70]. Moreover, nonverbal communication such as urgency cues create first impression that can affect sustained participation in online settings. OHSCs provide an opportunity for seeking and providing help and support to patients. For participants to receive such support, they must express their feelings and emotions in writings or just simply giving a "hug" or posting emoticons signifying "worries", "sadness", "support" or "appreciations" to elicit rapid and appropriate responses. The confirmation of the effect of nonverbal communication embedded in initial comments align closely with prior research that has shown that health communication empowers users to articulate their needs and engage in sustenance behaviors [20] [5]. Furthermore, efficiency of first impressions fosters online participation in that recipients of the support depend on the reliability of the messages. Therefore, exhibiting good judgement by providing reliable and useful information in the initial communication encourages others to benefit and do same; thus, patients are empowered to make use of the social, informational, and emotional supports to take control of their health concerns [33]. Lastly, although immediacy did not affect either giving or receiving participation, patients still consider the health needs of their friends and families to be important and in fact, which need to be addressed with urgency. Prior studies have revealed that the more immediate individuals are the more assertive and responsive they are to others' needs [21]. Such individuals communicate competently, effectively, and appropriately with varied people in different situations and contexts [61].

### **6.1. Implication for research and practice**

The results and findings of this study have implications both to research and practice. To

research, first, SPT assumes that low social presence is associated with less personal feelings and emotions expressed in the message. Whereas individuals who are motivated to receive are influenced by first impressions cues in the writings to express feelings and emotions, the giving individuals are more concerned with the sense of closeness and belonging cues expressed in the initial postings. Furthermore, SPT assumes that better communication is enjoyed with more cues in the initial postings. From the findings of this study, this assumption holds for patients inclined to giving participation as opposed to those persuaded to receive.

Second, participation was treated as a two-dimensional concept (giving and receiving) and the effects of social presence on each of the dimensions were examined. With this granular view, we uncover that first impression in patients' initial communication is important in eliciting user's participation in either giving or receiving. Specifically, the findings revealed that users' giving behaviors can follow a gradual process of first developing intimacy with the initiator of the post, followed by nonverbal communication cues that express feelings and emotions, followed by efficiency of the message, and finally by immediacy. On the other hand, users demonstrate participation in receiving on the impression created primarily through nonverbal communication, followed by immediacy, then efficiency, and lastly intimacy.

For practice, the findings could help platform managers to make informed decisions as to which social presence features they need to pay attention to in order to increase participation. Furthermore, studying participation as giving and receiving could help management understand patients who are motivated to participate by giving, hence promote receiving and those who are inclined to participate by receiving, hence stimulate giving.

### **6.2. Limitations and future research**

This study has some limitations. First, this current study used cross-sectional data of active users only. Second, as preliminary study, a small sample size used was used. Third, the focus of this study was on stigmatized and non-stigmatized disease communities. Consideration of other disease types will improve the study. Finally, this current study used data from only one health support community/platform.

### **7. Conclusion**

This study set out to identify the factors of social presence theory (SPT) in patients' initial postings that influence participation in OHSCs. This was based on the premise that first impression drives long term responses. SPT does not discriminate on the efficacy of each variable. The unstated assumption is that intimacy, immediacy, efficiency, and nonverbal



communication dimensions of SPT work equally as motivators of participation. That is, SPT assumes that each of the variables has the same effect. This study argued that each dimension of SPT has a different effect in OHSCs. The results of the decision tree revealed that intimacy and nonverbal communication have better effects on participation than efficiency and immediacy. The study provides valuable information to assist platform managers in decision-making for sustaining platform membership and participation. For instance, members with low intimacy, low immediacy, and low efficiency may receive more support than they give. Thus, management can watch out for such behaviors and develop motivational tactics to get these members engaged in giving.

## 8. References

- [1] Agarwal, R., G. (Gordon) Gao, C. DesRoches, and A.K. Jha, "The Digital Transformation of Healthcare: Current Status and the Road Ahead", *Information Systems Research* 21(4), 2010, pp. 796–809.
- [2] Argyle, M., and J. Dean, "Eye-contact, distance and affiliation", *Sociometry*, 1965, pp. 289–304.
- [3] Atkinson, E.J., and T.M. Therneau, "An introduction to recursive partitioning using the RPART routines", *Rochester: Mayo Foundation*, 2000.
- [4] Bar-Lev, S., "'We are here to give you emotional support': Performing emotions in an online HIV/AIDS support group", *Qualitative health research* 18(4), 2008, pp. 509–521.
- [5] Basu, A., and M.J. Dutta, "The relationship between health information seeking and community participation: The roles of health information orientation and efficacy", *Health communication* 23(1), 2008, pp. 70–79.
- [6] Bateman, P.J., P.H. Gray, and B.S. Butler, "Research note—the impact of community commitment on participation in online communities", *Information systems research* 22(4), 2011, pp. 841–854.
- [7] Cavusoglu, H., T.Q. Phan, H. Cavusoglu, and E.M. Airoidi, "Assessing the impact of granular privacy controls on content sharing and disclosure on Facebook", *Information Systems Research* 27(4), 2016, pp. 848–879.
- [8] Chen, L., A. Baird, and D. Straub, "Fostering participant health knowledge and attitudes: An econometric study of a chronic disease-focused online health community", *Journal of Management Information Systems* 36(1), 2019, pp. 194–229.
- [9] Chung, N., H. Han, and C. Koo, "Adoption of travel information in user-generated content on social media: the moderating effect of social presence", *Behaviour & Information Technology* 34(9), 2015, pp. 902–919.
- [10] Cobb, S.C., "Social presence and online learning: A current view from a research perspective.", *Journal of Interactive Online Learning* 8(3), 2009.
- [11] Compeau, L.D., D. Grewal, and K.B. Monroe, "Role of prior affect and sensory cues on consumers' affective and cognitive responses and overall perceptions of quality", *Journal of Business Research* 42(3), 1998, pp. 295–308.
- [12] Cottrell, N.B., D.L. Wack, G.J. Sekerak, and R.H. Rittle, "Social facilitation of dominant responses by the presence of an audience and the mere presence of others.", *Journal of personality and social psychology* 9(3), 1968, pp. 245.
- [13] Csikszentmihalyi, M., "The flow experience and its significance for human psychology.", 1988.
- [14] Cui, G., B. Lockee, and C. Meng, "Building modern online social presence: A review of social presence theory and its instructional design implications for future trends", *Education and information technologies* 18(4), 2013, pp. 661–685.
- [15] Dahlander, L., and S. O'Mahony, "Progressing to the center: Coordinating project work", *Organization science* 22(4), 2011, pp. 961–979.
- [16] Deci, E.L., "Ryan, RM (1985). Intrinsic motivation and self-determination in human behavior", *New York and London: Plenum*, 86.
- [17] Dixon, M.D., M.R. Greenwell, C. Rogers-Stacy, T. Weister, and S. Lauer, "Nonverbal immediacy behaviors and online student engagement: bringing past instructional research into the present virtual classroom", *Communication Education* 66(1), 2017, pp. 37–53.
- [18] Dixon, M.D., M.R. Greenwell, C. Rogers-Stacy, T. Weister, and S. Lauer, "Nonverbal immediacy behaviors and online student engagement: Bringing past instructional research into the present virtual classroom", *Communication Education* 66(1), 2017, pp. 37–53.
- [19] Driskell, R.B., and L. Lyon, "Are virtual communities true communities? Examining the environments and elements of community", *City & Community* 1(4), 2002, pp. 373–390.
- [20] Dutta-Bergman, M.J., "Demographic and psychographic antecedents of community participation: Applying a social marketing model", *Social Marketing Quarterly* 9(2), 2003, pp. 17–31.
- [21] Ellis, R.J.B., A.F. Carmon, and C. Pike, "A review of immediacy and implications for provider–patient relationships to support medication management", *Patient preference and adherence* 10, 2016, pp. 9.
- [22] Faraj, S., S. Kudaravalli, and M. Wasko, "Leading collaboration in online communities.", *Mis Quarterly* 39(2), 2015.
- [23] Fox, S., "Online health search 2006. Pew internet & American life project", *Washington, DC: Pew Research Center*, 2006.
- [24] Franceschi, K., R.M. Lee, S.H. Zanakakis, and D. Hinds, "Engaging group e-learning in virtual worlds", *Journal of Management Information Systems* 26(1), 2009, pp. 73–100.
- [25] Gao, L., X. Bai, and A. Park, "Understanding sustained participation in virtual travel communities from the perspectives of is success model and flow theory", *Journal of Hospitality & Tourism Research* 41(4), 2017, pp. 475–509.
- [26] Gefen, D., and D. Straub, "Managing user trust in B2C e-services", *e-Service* 2(2), 2003, pp. 7–24.
- [27] Hackworth, B.A., and M.B. Kunz, "Health care and social media: Building relationships via social networks.", *Academy of Health Care Management Journal* 7(2), 2011.
- [28] Hann, I.-H., J.A. Roberts, and S.A. Slaughter, "All are not equal: An examination of the economic returns to

- different forms of participation in open source software communities”, *Information Systems Research* 24(3), 2013, pp. 520–538.
- [29] Hubbard, A.S.E., and J.K. Burgoon, “Nonverbal communication”, In *An Integrated Approach to Communication Theory and Research, Third Edition*. Taylor and Francis, 2019, 333–345.
- [30] Huh, J., R. Patel, and W. Pratt, “Tackling dilemmas in supporting the whole person in online patient communities”, (2012), 923–926.
- [31] Inspire, “Inspire website. <http://www.inspire.com>. Accessed March 20, 2020.”, 2020. <http://www.inspire.com>
- [32] Jahng, M.R., and J. Littau, “Interacting is believing: Interactivity, social cue, and perceptions of journalistic credibility on Twitter”, *Journalism & Mass Communication Quarterly* 93(1), 2016, pp. 38–58.
- [33] Johnston, A.C., J.L. Worrell, P.M. Di Gangi, and M. Wasko, “Online health communities”, *Information Technology & People*, 2013.
- [34] Kaplan, A.M., and M. Haenlein, “Users of the world, unite! The challenges and opportunities of Social Media”, *Business horizons* 53(1), 2010, pp. 59–68.
- [35] Katz, J., “Luring the lurkers Retrieved March 20, 2011”, 1998.
- [36] Kim, H.-S., and S.S. Sundar, “Can online buddies and bandwagon cues enhance user participation in online health communities?”, *Computers in Human Behavior* 37, 2014, pp. 319–333.
- [37] Kreijns, K., P.A. Kirschner, W. Jochems, and H. Van Buuren, “Determining sociability, social space, and social presence in (a) synchronous collaborative groups”, *CyberPsychology & Behavior* 7(2), 2004, pp. 155–172.
- [38] Latané, B., K. Williams, and S. Harkins, “Many hands make light the work: The causes and consequences of social loafing.”, *Journal of personality and social psychology* 37(6), 1979, pp. 822.
- [39] Li, J., “A privacy preservation model for health-related social networking sites”, *Journal of medical Internet research* 17(7), 2015, pp. e168.
- [40] Li, N., and D.D. Wu, “Using text mining and sentiment analysis for online forums hotspot detection and forecast”, *Decision support systems* 48(2), 2010, pp. 354–368.
- [41] Lim, E.-P., H. Chen, and G. Chen, “Business intelligence and analytics: Research directions”, *ACM Transactions on Management Information Systems (TMIS)* 3(4), 2013, pp. 1–10.
- [42] Liu, N., and H. Chan, “A social identity perspective on participation in virtual healthcare communities”, 2011.
- [43] Love, B., B. Crook, C.M. Thompson, et al., “Exploring psychosocial support online: a content analysis of messages in an adolescent and young adult cancer community”, *Cyberpsychology, Behavior, and Social Networking* 15(10), 2012, pp. 555–559.
- [44] Ma, H., C.E. Smith, L. He, et al., “Write for life: Persisting in online health communities through expressive writing and social support”, *Proceedings of the ACM on Human-Computer Interaction* 1(CSCW), 2017, pp. 1–24.
- [45] Ning Shen, K., and M. Khalifa, “Exploring multidimensional conceptualization of social presence in the context of online communities”, *Intl. Journal of human-computer interaction* 24(7), 2008, pp. 722–748.
- [46] Nonnecke, B., J. Preece, and D. Andrews, “What Lurkers and Posters Think of Each Other.”, *HICSS*, Citeseer (2004).
- [47] Osei-Bryson, K.-M., and O. Ngwenyama, “Using decision tree modelling to support Peircian abduction in IS research: a systematic approach for generating and evaluating hypotheses for systematic theory development”, *Information Systems Journal* 21(5), 2011, pp. 407–440.
- [48] Osei-Bryson, K.-M., and O. Ngwenyama, “Using decision tree modelling to support Peircian abduction in IS research: a systematic approach for generating and evaluating hypotheses for systematic theory development”, *Information Systems Journal* 21(5), 2011, pp. 407–440.
- [49] Parameswaran, S., and R. Kishore, “Social Support in Online Health Communities: A Social-Network Approach”, *Proceedings of the 2018 ACM SIGMIS Conference on Computers and People Research*, (2018), 93–94.
- [50] Rice, R.E., “Media appropriateness: Using social presence theory to compare traditional and new organizational media”, *Human communication research* 19(4), 1993, pp. 451–484.
- [51] van Riessen, B., R.R. Negenborn, and R. Dekker, “Real-time container transport planning with decision trees based on offline obtained optimal solutions”, *Decision Support Systems* 89, 2016, pp. 1–16.
- [52] Robert, L.P., and A.R. Dennis, “Paradox of richness: A cognitive model of media choice”, *IEEE transactions on professional communication* 48(1), 2005, pp. 10–21.
- [53] Rueger, J., W. Dolfmsma, and R. Aalbers, “Perception of Peer Advice in Online Health Communities Access to Lay Expertise”, *Social Science & Medicine*, 2020, pp. 113117.
- [54] Schaefer, M.T., and D.H. Olson, “Assessing intimacy: The PAIR inventory”, *Journal of marital and family therapy* 7(1), 1981, pp. 47–60.
- [55] Short, J., E. Williams, and B. Christie, *The social psychology of telecommunications*, John Wiley & Sons, 1976.
- [56] Silience, E., “Giving and receiving peer advice in an online breast cancer support group”, *Cyberpsychology, Behavior, and Social Networking* 16(6), 2013, pp. 480–485.
- [57] Smith, C., Z. Levonian, H. Ma, et al., “‘I Cannot Do All of This Alone’: Exploring Instrumental and Prayer Support in Online Health Communities”, *arXiv preprint arXiv:2005.11884*, 2020.
- [58] Solberg, L.B., “The benefits of online health communities”, *AMA Journal of Ethics* 16(4), 2014, pp. 270–274.
- [59] Spence, M., “Job market signaling”, In *Uncertainty in economics*. Elsevier, 1978, 281–306.
- [60] Srivastava, S.C., and S. Chandra, “Social presence in virtual world collaboration: An uncertainty reduction perspective using a mixed methods approach”, *MIS Quarterly* 42(3), 2018, pp. 779–804.
- [61] Thomas, C.E., V.P. Richmond, and J.C. McCroskey, “The association between immediacy and socio-communicative style”, *Communication Research Reports* 11(1), 1994, pp. 107–114.
- [62] Tu, C.-H., “On-line learning migration: from social learning theory to social presence theory in a CMC environment”, *Journal of network and computer applications* 23(1), 2000, pp. 27–37.

- [63] Tu, C.-H., and M. McIsaac, “The relationship of social presence and interaction in online classes”, *The American journal of distance education* 16(3), 2002, pp. 131–150.
- [64] Turner, J.W., and S.K. Foss, “Options for the construction of attentional social presence in a digitally enhanced multicommunicative environment”, *Communication Theory* 28(1), 2018, pp. 22–45.
- [65] Tweet, M.S., R. Gulati, L.A. Aase, and S.N. Hayes, “Spontaneous coronary artery dissection: a disease-specific, social networking community-initiated study”, Elsevier (2011), 845–850.
- [66] Valkenburg, P.M., “Understanding self-effects in social media”, *Human Communication Research* 43(4), 2017, pp. 477–490.
- [67] Van Oerle, S., D. Mahr, and A. Lievens, “Coordinating online health communities for cognitive and affective value creation”, *Journal of Service Management*, 2016.
- [68] Vayena, E., and J. Tasioulas, “Adapting standards: ethical oversight of participant-led health research”, *PLoS Med* 10(3), 2013, pp. e1001402.
- [69] Wang, E.S.-T., and L.S.-L. Chen, “Forming relationship commitments to online communities: The role of social motivations”, *Computers in Human Behavior* 28(2), 2012, pp. 570–575.
- [70] Wang, Y.-C., R. Kraut, and J.M. Levine, “To stay or leave? The relationship of emotional and informational support to commitment in online health support groups”, *Proceedings of the ACM 2012 conference on computer supported cooperative work*, (2012), 833–842.
- [71] Wasko, M.M., and S. Faraj, “Why should I share? Examining social capital and knowledge contribution in electronic networks of practice”, *MIS quarterly*, 2005, pp. 35–57.
- [72] Watson, D., L.A. Clark, and A. Tellegen, “Development and validation of brief measures of positive and negative affect: the PANAS scales.”, *Journal of personality and social psychology* 54(6), 1988, pp. 1063.
- [73] Wei, J., S. Seedorf, P.B. Lowry, C. Thum, and T. Schulze, “How increased social presence through co-browsing influences user engagement in collaborative online shopping”, *Electronic Commerce Research and Applications* 24, 2017, pp. 84–99.
- [74] Xu, C., S. Ryan, V. Prybutok, and C. Wen, “It is not for fun: An examination of social network site usage”, *Information & Management* 49(5), 2012, pp. 210–217.
- [75] Xu, W.W., and C. Zhang, “Sentiment, richness, authority, and relevance model of information sharing during social Crises—the case of# MH370 tweets”, *Computers in Human Behavior* 89, 2018, pp. 199–206.
- [76] Yang, D., R. Kraut, and J.M. Levine, “Commitment of newcomers and old-timers to online health support communities”, *Proceedings of the 2017 CHI conference on human factors in computing systems*, (2017), 6363–6375.
- [77] Yang, X., G. Li, and S.S. Huang, “Perceived online community support, member relations, and commitment: Differences between posters and lurkers”, *Information & management* 54(2), 2017, pp. 154–165.
- [78] Zelizer, V.A., “The purchase of intimacy”, *Law & Social Inquiry* 25(3), 2000, pp. 817–848.
- [79] Zhang, Z., J. Wen, X. Wang, and C. Zhao, “A novel crowd evaluation method for security and trustworthiness of

online social networks platforms based on signaling theory”, *Journal of computational science* 26, 2018, pp. 468–477.

## Appendix A: ANOVA Decision Tree

